KCET-2015 (Chemistry)

1. The unit cell with crystallographic dimensions, $a \neq b \neq c$, $\alpha = \gamma = 90$ and $\beta \neq 90$ is
   a. Triclinic
   b. Monoclinic
   c. Orthorhombic
   d. Tetragonal

2. While charging the lead storage battery._____.
   a. $PbSO_4$ on anode is reduced to Pb
   b. $PbSO_4$ on cathode is reduced to Pb
   c. $PbSO_4$ on cathode is oxidized to Pb
   d. $PbSO_4$ on anode is oxidized to PbO_2

3. Adenosine is an example of
   a. Nucleotide
   b. Purine base
   c. Pyrimidine base
   d. Nucleoside

4. Orlon has monomeric unit
   a. Acrolein
   b. Glycol
   c. Vinyl cyanide
   d. Isoprene

5. The two electrons have the following set of quantum numbers :

   $P = 3, 2, -2, +\frac{1}{2}$

   $Q = 3, 0, 0, +\frac{1}{2}$

   Which of the following statement is true ?
   a. P and Q have same energy
   b. P has greater energy than Q
   c. P has lesser energy than Q
   d. P and Q represent same electron

6. H_2O_2 cannot oxidise
   a. PbS
   b. Na_2SO_3
   c. O_3
   d. KI

7. In the given set of reactions, 2-Bromopropane

   $\xrightarrow[\text{alc./heat}]{AgCN}$ X $\xrightarrow{LiA/H_4}$ Y the IUPAC name of product 'Y' is
   a. N-Methylpropanamine
   b. N-Isopropylmethanamine
   c. Butan-2-amine
   d. N-Methylpropan-2-amine

8. On heating with concentrated NaOH solution in an inert atmosphere of CO_2, white phosphorous gives a gas. Which of the following statement is incorrect about the gas ?
   a. It is less basic than NH_3
   b. It is more basic than NH_3
   c. It is highly poisonous and has smell like rotten fish.
   d. It's solution in water decomposes in the presence of light.

9. Sodium metal crystallizes in B.C.C. lattice with edge length of 4.29 Å. The radius of sodium atom is
   a. 2.857 Å
   b. 1.601 Å
   c. 2.145 Å
   d. 1.857 Å

10. 0.06% (w/v) aqueous solution of urea is isotonic with
   a. 0.06% glucose solution
   b. 0.6% glucose
   c. 0.01 M glucose solution
   d. 0.1 M glucose solution

11. In a first order reaction, the concentration of the reactant is reduced to 12.5% in one hour. When was it half completed ?
   a. 3 hr
   b. 20 min
   c. 30 min
   d. 15 min

12. The electrolyte having maximum flocculation value for AgI/Ag^{+} sol. is
   a. NaCl
   b. Na_2S
   c. Na_2SO_4
   d. Na_3PO_4

13. Copper is extracted from Copper pyrites by heating in a Bessemer converter. The method is based on the principle that
   a. Copper has more affinity for oxygen than Sulphur at high temperature.
   b. Iron has less affinity for oxygen than Sulphur at high temperature.
   c. Copper has less affinity for oxygen than Sulphur at high temperature.
   d. Sulphur has less affinity for oxygen at high temperature.

14. Which of the following will be able to show geometrical isomerism?
   a. MA_3 B – Square planar
   b. MA_2 B_2 – Tetrahedral
   c. MABCD – Square planar
   d. MABCD – Tetrahedral

15. The electronic configuration of Gd^{2+} is (at. No. of Gd is 64)
   a. [Xe] $4f^{+8}$
   b. [Xe] $4f^{8}$
   c. [Xe] $4f^{+7}$ $5d^{1}$ $6s^{2}$
   d. [Xe] $4f^{+7}$ $5d^{1}$

16. $MSO_4 \xrightarrow{NH_4OH} \downarrow \underset{\text{white}}{X} \xrightarrow[\text{excess}]{NH_4OH} Y \xrightarrow{H_2S} \downarrow Z$

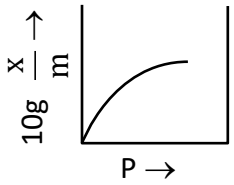
   Here M and Z are
   a. Cu, ZnS
   b. Zn, ZnS
   c. Fe, FeS
   d. AI, AI_2S_3

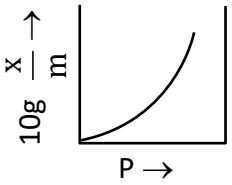
17. The hydrolysis of optically active 2-bromobutane with aqueous NaOH result in the formation of
   a. (+) butan-2-ol
   b. (–) butan-2-ol
   c. (±) butan-1-ol
   d. (±) butan-2-ol

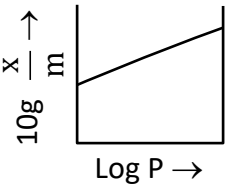
KCET-2015 (Chemistry)

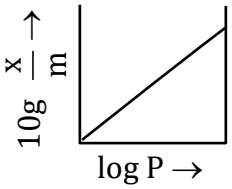
18. The distinguishing test between methanoic acid and ethanoic acid is
    a. Litmus test
    b. Tollen's test
    c. Esterification test
    d. Sodium bicarbonate test

19. In H_2–O_2 fuel cell the reaction occurring at cathode is
    a. $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(l)}$
    b. $O_{2(g)} + 2H_2O_{(l)} + 4e^- \longrightarrow 4\bar{O}H_{(aq)}$
    c. $H^+ + e^- \longrightarrow \frac{1}{2}H_2$
    d. $H^+_{(aq)} + \bar{O}H_{(aq)} \longrightarrow H_2O_{(l)}$

20. Which of the following curve is in accordance with Freundlich adsorption isotherm?
    a. 

    b. 

    c. 

    d. 

21. How many ions per molecule are produced in the solution when Mohr salt is dissolved in excess of water?
    a. 4
    b. 5
    c. 6
    d. 10

22. Glycogen is
    a. a polymer of β-D-glucose units
    b. a structural polysaccharide
    c. structurally very much similar to amylopectin
    d. structurally similar to amylopectin but extensively branched

23. Number of possible alkynes with formula C_5H_8 is
    a. 2
    b. 3
    c. 4
    d. 5

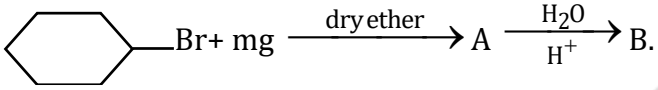
24. Which of the following aqueous solution has the highest freezing point ?
    a. 0.1 M Sucrose
    b. 0.01 M NaCl
    c. 0.1 M NaCl
    d. 0.01 M Na_2SO_4

KCET-2015 (Chemistry)

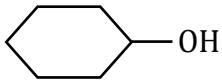
25. Half life period of a first order reaction is 10 min.. Starting with initial concentration 12 M, the rate after 20 min is
    a. 0.0693 M min^{-1}
    b. 0.693 × 3 M min^{-1}
    c. 0.0693 × 3 M min^{-1}
    d. 0.0693 × 4 min^{-1}

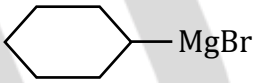
26. The salt which responds to dilute and concentrated H_2SO_4 is
    a. CaF_2
    b. $Ba(NO_3)_2$
    c. Na_2SO_4
    d. Na_3PO_4

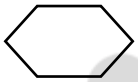
27. On heating potassium permanganate, one of the following compound is not obtained :
    a. O_2
    b. MnO
    c. MnO_2
    d. K_2MnO_4

28. 

The product 'B' is

a. 

b. 

c. 

d. 

29. The formation of cyanohydrins from a ketone is an example of
    a. Nucleophilic substitution
    b. Nucleophilic addition
    c. Electrophilic addition
    d. Electrophilic substitution

30. One of the following is an essential amino acid
    a. Tyrosine
    b. Cysteine
    c. Isoleucine
    d. Serine

31. The aqueous solution of following salt will have the lowest pH :
    a. $NaClO_3$
    b. NaClO
    c. $NaClO_2$
    d. $NaClO_4$

32. For one of the element various successive ionization enthalpies (in kJ mol^{-1}) are given below :

I.E.	1st	2nd	3nd	4th	5th
	577.5	1810	2750	11, 580	14,820

The element is
    a. Si
    b. P
    c. Al
    d. Mg

33. 0.30 g of an organic compound containing C, H and Oxygen on combustion yields 0.44 g CO_2 and 0.18 g H_2O. If one mol of compound weight 60, then molecular formula of the compound is
    a. CH_2O
    b. C_3H_8O
    c. C_4H_6O
    d. $C_2H_4O_2$

34. One of the following amide will not undergo Hoffmann bromamide reaction:
    a. CH_3CONH_2
    b. $CH_3CONHCH_3$
    c. $C_6H_5CONH_2$
    d. $CH_3CH_2CONH_2$

35. Cheilosis and digestive disorders are due to the deficiency of
    a. Thiamine
    b. Ascorbic acid
    c. Riboflavin
    d. Pyridoxine

36. How many Coulombs of electricity are required for the oxidation of one mol of water to dioxygen?
    a. 9.65×10^4 C
    b. 1.93×10^4 C
    c. 1.93×10^5 C
    d. 19.3×10^5 C

37. 100 cm^3 of 1 M CH_3COOH was mixed with 100 cm^3 of 2 M CH_3OH to form an ester. The change in the initial rate if each solution is diluted with equal volume of water would be
    a. 2 times
    b. 4 times
    c. 0.5 times
    d. 0.25 times

38. Which of the following colloids cannot be easily coagulated?
    a. Lyophobic colloids
    b. Multimolecular colloids
    c. Macromolecular colloids
    d. Irreversible colloids

39. The complex ion having minimum magnitude of Δ_0(CFSE) is
    a. $[Cr(CN)_6]^{3-}$
    b. $[Co(NH_3)_6]^{3+}$
    c. $[Co(Cl)_6]^{3-}$
    d. $[Cr(H_2O)_6]^{3+}$

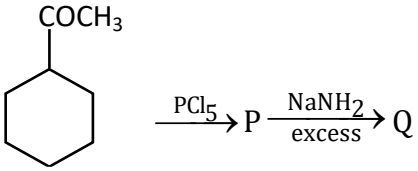
40. The arrangement of following compounds:
    i. bromomethane
    ii. bromoform
    iii. chloromethane
    iv. dibromomethane
    In the increasing order of their boiling point is
    a. iii < i <iv < ii
    b. iv < iii < i < ii
    c. ii < iii < i < iv
    d. i < ii < iii < iv

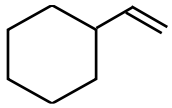
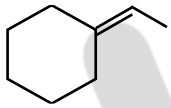
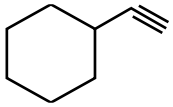
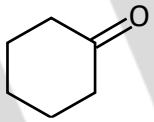
KCET-2015 (Chemistry)

41. Iodoform can be prepared from all, except

a. propan-2-ol
b. butan-2-one
c. propan-1-ol
d. acetophenone

42. Identify 'Q' in the following sequence of reactions:



a. 
b. 
c. 
d. 

43. Cryolite is

a. Na_3AlF_6 and is used in the electrolysis of alumina for decreasing electrical conductivity.
b. Na_3AlF_6 and is used in the electrolysis of alumina for lowering the melting point of alumina only.
c. Na_3AlF_6 and is used in the electrolysis of alumina for lowering the melting point and increasing the conductivity of alumina.
d. Na_3AlF_6 and is used in the electrolytic refining of alumina.

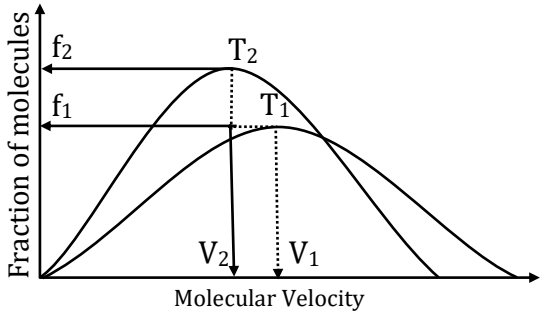
44. Which of the following compound of Xenon has pyramidal geometry?

a. $XeOF_4$
b. XeF_2
c. XeO_3
d. XeF_4

45. After adding non-volatile solute freezing point of water decreases to –0.186°C. Calculate ΔT_b if $K_f = 1.86$ K kg mol^{-1} and $K_b = 0.521$ K kg mol^{-1}

a. 0.521
b. 0.0521
c. 1.86
d. 0.0186

46. Plot of Maxwell's distribution of velocities is given below:



Which of the following is correct about this plot?

a. $T_1 < T_2$
b. $f_1 > f_2$
c. $T_1 > T_2$
d. $V_1 < V_2$

47. The pair of compound which cannot exist together in solution is

a. $NaHCO_3$ and NaOH
b. $NaHCO_3$ and H_2O
c. $NaHCO_3$ and Na_2CO_3
d. Na_2CO_3 and NaOH

48. What amount of dioxygen (in gram) contains 1.8×10^{22} molecules?

a. 0.0960
b. 0.960
c. 9.60
d. 96.0

49. Using MOT, compare O_2^+ and O_2^- species and choose the incorrect option

a. O_2^+ have higher bond order than O_2^-.
b. O_2^- is less stable
c. O_2^+ is diamagnetic while O_2^- is paramagnetic
d. Both O_2^+ and O_2^- are paramagnetic

50. Which of the following is not true?

a. Erythromycin is a bacteriostatic antibiotic
b. Ampicillin is not a natural antibiotic
c. Prontosil is not converted into sulfanilamide in the body
d. Vancomycin is a broad-spectrum antibiotic.

51. In the reaction

$$S + \frac{3}{2}O_2 \longrightarrow SO_3 + 2x \text{ kJ and } SO_2 + \frac{1}{2}O_2 \longrightarrow SO_3 + y \text{ kJ}$$

Heat of formation of SO_2 is

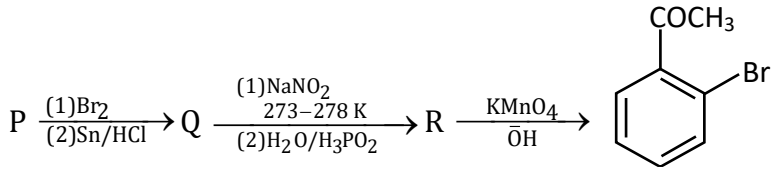
a. x + y
b. x –y
c. 2x – y
d. 2x + y

52. Arrange the following compounds in the increasing order of their acidic strength:

i. m-nitrophenol
ii. m-cresol
iii. phenol
iv. m-chlorophenol

a. iii < ii < I < iv
b. ii < iv < iii < i
c. ii < iii < iv < i
d. ii < iii < I < iv

53. In the sequence of following reactions:



The starting compound 'P' is

a. o-nitro toluene
b. m-nitro toluene
c. o-bromo toluene
d. p-nitro toluene

54. Acetic acid is treated with $Ca(OH)_2$ and the product so obtained is subjected to dry distillation. The final product is

a. ethanal
b. propanal
c. propanone
d. ethanol

55. The correct statement is

a. BF_3 is the strongest Lewis acid among the other boron halides.
b. BI_3 is the weakest Lewis acid among the boron halides.
c. There is maximum $p\pi-p\pi$ back bonding in BF_3.
d. There is minimum $p\pi-p\pi$ back bonding in BF_3.

56. Which of the following compound possesses the "C – H" bond with the lowest bond dissociation energy?

a. Toluene
b. Benzene
c. n-pentane
d. 2, 2-dimethyl propane

57. In presence of HCl, H_2S results the precipitation of Group-2 elements but not Group-4 elements during qualitative analysis. It is due to

a. higher concentration of S^{2-}
b. higher concentration of H^+
c. lower concentration of S^{2-}
d. lower concentration of H^+

58. One of the following conversion results in the change of hybridization and geometry :

a. CH_4 to C_2H_6
b. NH_3 to $\overset{+}{N}H_4$
c. BF_3 to $B\bar{F}_4$
d. H_2O to $H_2\overset{+}{O}$

59. Water softening by Clark's process uses
    a. $CaHCO_3$
    b. $NaHCO_3$
    c. Na_2CO_3
    d. $Ca(OH)_2$

60. An alkali metal hydride (NaH) reacts with diborane in 'A' to give a tetrahedral compound 'B' which is extensively used as reducing agent in organic synthesis. The compounds 'A' and 'B' respectively are
    a. C_2H_6 and C_2H_5Na
    b. CH_3COCH_3 and $B_3N_3H_6$
    c. C_6H_6 and $NaBH_4$
    d. $(C_2H_5)_2O$ and $NaBH_4$

KCET-2015 (Chemistry)

ANSWER KEYS

* G – Indicates one Grace mark awarded for the question number.

1. (b)	2. (a)	3. (d)	4. (c)	5. (b)	6. (c)	7. (d)	8. (b)	9. (d)	10. (c)
11. (b)	12. (a)	13. (a)	14. (c)	15. (d)	16. (b)	17. (d)	18. (b)	19. (b)	20. (c)
21. (b)	22. (d)	23. (b)	24. (b)	25. (c)	26. (b)	27. (b)	28. (c)	29. (b)	30. (c)
31. (d)	32. (c)	33. (d)	34. (b)	35. (c)	36. (c)	37. (d)	38. (c)	39. (c)	40. (a)
41. (c)	42. (c)	43. (c)	44. (c)	45. (b)	46. (c)	47. (a)	48. (b)	49. (c)	50. (c)
51. (G)	52. (c)	53. (d)	54. (c)	55. (c)	56. (a)	57. (c)	58. (c)	59. (d)	60. (d)

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Solution

1. (b)

'2' The unit cell with crystallographic dimensions $a \neq b \neq c$; $\alpha = r = 90$ and $\beta \neq 90$ is a monoclinic unit cell. Triclinic unit cell has crystallographic dimensions $a \neq b \neq c$; $\alpha = \beta = r = 90°$. Pentagonal unit cell has crystallographic dimensions $a \neq b \neq c$; $\alpha = \beta = r = 90°$.

Orthorhombic unit cell has crystallographic dimensions $a \neq b \neq c$; $\alpha = \beta = r = 90°$.

$\rightarrow$ The monoclinic crystal system is one of seven crystal systems. A crystal system is described by three vectors. In the monoclinic system, the crystal is described by vectors of unequal lengths, as in the orthorhombic system. They form a rectangular prism with a parallelogram as its base. The unit cell will be monoclinic.

2. (a)

The charging equation is

$2PbSO_4(s) + 2H_2O(l) \rightarrow Pb(s) + PbO_2(s) + 2H^+(aq) + 2HSO_4^-(aq)$

Lead storage batteries can be used in automobiles these batteries can be recharged in the charged state each cell contain negative plates of lead (Pb) and positive plates of lead (IV) inside (PbO_2) in an electrolyte of approximately 4.2 m-sulphuric acid (H_2SO_4). The charging process is driven by the forcible removal of electrons from the positive plate and the forcible introduction of them to negative plate by the charging source.

3. (d)

Adenosine is a nucleoside consisting of adenine and ribose sugar linked glycosidic bond.

A nucleoside consists simply of a nucleoside and five carbon sugar, where as a nucleotide is composed of nucleobase , a five carbon sugar, and one or more phosphate groups. In a nucleoside the anomeric carbon is linked through a glycoside bond to the N_9 of a purine . Examples of nucleosides include. Cytidine, uridine, adenosine, guanidine etc.

4. (c)

Orlon is an example of polyacrylonitrile (PAN)

$$NCH_2 = CHCN \xrightarrow[\text{peroxibe catalyst}]{\text{polymerisation}} \rightarrow [-CH_2-\underset{\underset{CN}{|}}{CH}-]_n$$

acrylonitrile polyacrylonitrile

The monomer unit of orlon is acrylonitrile /vinyl cyanide.

5. (b)

Orbitals are filled in order of increasing value of (n + l). If 2 orbitals have same value (n + l), then the orbitals with lower value of n will be filled first for p(n + l) = 3 + 2 = 5. For a (n + l) = 3 + 0 = 3. So p has greater energy than q.

6. (c)
Ozone is stronger oxidizing agent than H_2O_2. Ozone is highly unstable hence, it dissociates to form O_2 molecule and nascent oxygen which extremely or highly unstable and hence it reacts quickly to oxidize anything in order to attain stability H_2O_2 can't oxidize O_3.

7. (d)

$$H_3C{-}\underset{\displaystyle Br}{\underset{|}{CH}}{-}CH_3 \xrightarrow[\text{Alc/Heat}]{\text{AgCN}} H_3C{-}\underset{\displaystyle Nc}{\underset{|}{CH}}{-}CH_3$$

2- bromopropane (x) isocyanides

$$H_3C{-}\underset{\displaystyle NC}{\underset{|}{CH}}{-}CH_3 \xrightarrow{LiAlH_4} H_3C{-}\underset{\displaystyle HN{-}CH_3}{\underset{|}{CH}}{-}CH_3$$

(X)

Nitrogen is free to donate electron pair forming isocyanides. Isonitrides on reduction with $LiAlH_4$ gives secondary amines.

8. (b)
On heating with concentrated NaOH in an inert environment of CO_2 the reaction will be
$Pu + 3NaOH + 3H_2O \rightarrow PH_3 + 3NaH_2PO_2$
PH_3 is formed which is more basic than NH_3.

9. (d)
In BCC structure the radius of sodium atom is 0.433 a
So, 0.433 × 4.29 Å = 1.86 Å

10. (c)
Given : 0.06 % w/v solution of urea
so moles of urea = $\frac{0.06}{60}$ = 0.001 mol

$\therefore$ Molality of urea solution = $\frac{0.001}{100} \times 1000 = 0.01$ m

$\because$ Reaction constant should be same for isotonic
So 0.01 m glucose solution

11. (b)
Assuming initial concentration is 100 % concentration after three half lives = 1205.1

Half life = $\frac{60\,\text{min}}{3}$ = 20 min

12. (a)
The electrolyte having minimum coagulating power will have maximum flocculation value. Hence, NaCl having lowest charge will have minimum coagulation power hence maximum flocculation value.

13. (a)
The reactions involved during extraction of copper. From copper pyrites are

$2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$

$2Cu_2O + Cu_2S \rightarrow 2Cu + SO_2$

Copper pyrites are heated in blast furnace and the principle used here is that copper has high. Affinity for oxygen than sulphur at high temperature.

14. (c)
As it is known fact that tetrahedral arrangement does not show GI while square planar shows GI. But the condition is that all groups must be different. In MA_3B all the arrangements will be the same hence it will not show Gi. Therefore, only MABCD will show GI.

15. (d)
'4' The electronic configuration of Gd is [Xe] $4f^7\ sd^1\ 6s^2$ then the configuration of Gd^{+2} will be [Xe]$4f^7\ 5d^1$.

16. (b)

$$MSO_4 \xrightarrow{NH_4OH} \underset{\text{(white)}}{\underset{(x)}{Zn(OH)_2}} \xrightarrow[\text{excess}]{NHClOH} \underset{(y)}{[Zn(NH_3)_4]^{2+}\,(aq)}$$

$$\underset{(y)}{[Zn(NH_3)_4]^{2+}\,aq} \xrightarrow{H_2S} \underset{\text{(zinc sulphide)}}{\underset{(z)}{Zns}}$$

The reaction of MSO_4 with NH_4OH gives a white ppt of $Zn(OH)_2$ which when reacted with excess of NH_4OH. Gives a complex $[Zn(NH_3)_4]^{2+}$. When $[Zn(NH_3)_4]^{2+}$. Complex is allowed to react with H_2S it will give Zns. Zinc sulphide so m is zinc and z is zinc sulphide.

17. (d)
The reaction of 2-Bromobutane with NaOH is :

$$CH_3{-}\underset{\displaystyle Br}{\underset{|}{CH}}{-}CH_2{-}CH_3 \xrightarrow{\text{aq NaOH}} CH_3{-}\underset{\displaystyle OH}{\underset{|}{CH}}{-}CH_2{-}CH_3 + Br^-$$

∵ The compound have chiral centre so it will be. Optically active and give 50-50 % mixture of enantiomers or racemic mixture

∵ ± butan-α-al

18. (b)

Aldehydes give positive tollen's test. Methanoic acid is exception as it has a hydrogen atom as substituent not in any other group attached. So it will give a positive tollen's test like aldehyde. Ethanoic acid does not give tollens test.

19. (b)

For H_2O_2 cell the reactions of cathode and anode are.

At cathode: $O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-(aq)$

At anode

$2H_2(g) + 4OH^-(aq) + 4e^- \rightarrow 2H_2O(l)$

So overall reaction is

$2H_2(g) + O_2(g) + 2H_2O$ (d)

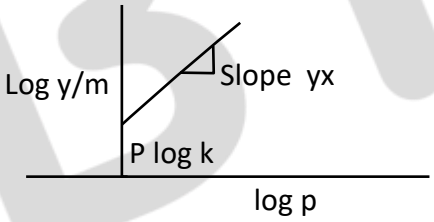
20. (c)

For Freundlich adsorption isotherm

$\frac{x}{m} \alpha\ P^{1/x}$ or $\frac{x}{m} = KP^{1/x}$ .....(i)

So, $\log \frac{x}{m} = \log k + \frac{1}{x} \log P$

Now, plotting group between $\log \left(\frac{x}{m}\right)$ and log P with slope $\frac{1}{x}$ will be



21. (b)

When Mohr salt is added in water the dissociation will be as follows.

$FeSO_4 \cdot (NH_4)_2 SO_4 \cdot H_2O \rightarrow fe^{+2} + 2NH_4^{\oplus} + 2SO_4^{2-} + 6H_2O$

So, total 5 ions are obtained.

22. (d)

Glycogen is multibranched polysaccharide of glucose that serves as form of energy storage in animals, fungi. It is condensation polymer of α-Glucose, its formula is $C_6H_{10}O_5$.

23. (b)

The total alkynes possible by formula C_5H_8 are :

$CH_3–CH_2–CH_2–C \equiv CH$, $CH_3–CH_2–C \equiv C – CH_3$

$CH_3–CH(CH_3)–C\equiv CH$, so there are three possible structures

24. (b)

For finding freezing point we will use the equation

$\Delta T_f = PK_f m$ where k_f = constant

So ΔT_f depends on I i.e. van't Hoff's factor and Molarity only

$NaCl \rightarrow Na^+ + Cl^-$; I = 2

For Na_2SO_4 , i = 3 for $C_{12}H_{22}O_{11}$ i = 1

So ΔT_f will be lowest at 0.01 m NaCl

$\because$ it will have the highest freezing point.

25. (c)

$fy_2 = \frac{0.693}{k}$ given fy_2 = 10 min

$K = \frac{0.693}{10}$; k = 0.0693

Rate = K[A] $\because$ first order reaction

$= 0.0693 \times 3 \text{ m min}^{-1}$

26. (b)

$Ba(NO_3)_2 + H_2SO_4$ (dil) $\rightarrow BaSO_4(s) + 2H^{\oplus} + 2NO_3^-$ CaCl

$Va(NO_3)_2 + H_2SO_4$ (conc) $\rightarrow BaSO_4(s) + 2NHO_3$

$\because$ $Ba(NO_3)_2$ responds to both dilute and conc. H_2SO_4.

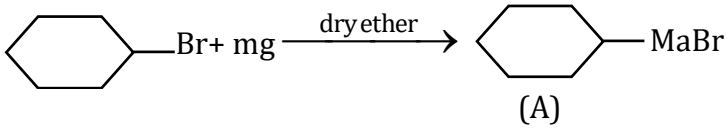
27. (b)

Heating reaction of potassium permanganate is

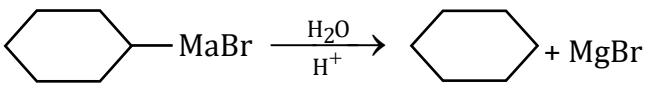
$2KMnO_4 \xrightarrow[513k]{\Delta} Ka\ MnO_4 + MnO_2 + O_2$

$\because$ MnO is not obtained ans is 2

28. (c)



(A)

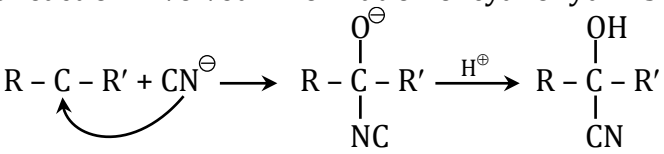


B

Cyclohexane is the final product.

29. (b)

The reaction involved in formation of cyanohydrins from a ketone is



By seeing reaction mechanism we can conclude that CN^- is neucleophile hence it is ncuclophilic addition reaction.

30. (c)

Essential amino acids are amino acids which cannot be synthesized by our body and are taken from external sources. Here isolecine is essential amino acid.

31. (d)

The acidic strength of oxoacids of chlorine increases with increase in chlorine's oxidation no. So finding oxidation number X of Cl

in $HClO_2$	$1 + x - 4 = 0$	$x = +3$
in $HClO_3$	$1 + x - 6 = 0$	$x = +5$
in $HClO_2$	$1 + x - 4 = 0$	$x = +3$
in $HClO_4$	$1 + x - 8 = 0$	$x = +7$

So acidic strength will be in order

$HClO_4 > HClO_3 > HClO_2 > HClO$

More the strong acid lower will be the PH so $HClO_4$ is strongest acid thus its salt $NaClO_4$ will have lowest PH.

32. (c)

By seeing data, we can conclude that after ionization energy 3, ionization energies are very high which indicates that element has attained stability after ionization energy 3, so element will be aluminum (Al)

33. (d)

Moles of C = moles of CO_2

$$\text{Moles of } CO_2 = \frac{\text{Given mass}}{\text{molar mass}}$$

$$= \frac{0.44}{44} = 0.01 \text{ moles}$$

Moles of H = 2α moles of H_2O

$$= 2\alpha \ \frac{0.18}{18} = 0.02 \text{ moles}$$

Weight of oxygen = 0.30– wt e of carbon- wt of hydrogen

$= 0.3 - 0.01\times 12 - 0.02 \times 1 = 0.16$ am

Moles of O = $\frac{0.16}{16}$ = 0.01 moles

34. (b)
Hoffman bromamide reaction is shown only by primary amide.
∴ among the following $CH_3CONHCH_3$ is not primary amide so it will not give Hoffman bromide reaction.

35. (c)
Saliva collecting at the corners of the mouth can cause a build of microorganisms leading to angular cheilitis.
It is caused by vitamin B. It is a digestive Disorder. Vitamin B is also known as Riboflavin.

36. (c)
$H_2O\ 1 \rightarrow 2H^{\oplus} + O + 2e^-$ o electrolysis if for 0 = 2
∴ Charge required = $2 \times 965006 = 1.93 \times 10^5 C$

37. (d)
Reaction is :
$CH_3COOH + CH_3OH \xrightarrow{con.H_2SO_4} CH_3COOCH_3 + H_2O$
$100\ cm^3$ $100 cm^3$
1 m 2m
Rate = k (CH_3COOH) (C_2H_5OH)
Initial Rate : $R_1 = k(a)(b)$
Final rate : $K\left(\frac{a}{2}\right)\left(\frac{b}{2}\right)$

$$\frac{R_2}{R_1} = \frac{k(a/2)(b/2)}{k(a)(b)} = \frac{\alpha b/4}{ab} = \frac{1}{4}$$

$$\frac{R_2}{R_1} = 0.25$$

38. (c)
Macro molecular colloids are a type of Lyophobic colloids. Lyophobic colloids are stable and do not easily coagulate. So answer is macromolecular colloid.

39. (c)
When complex contains web ligand than CFSE has lower value.
∴ CFSE decreases in order
$[CO(NH_3)_6]^{3+} > [Cr(CN)_6]^{3-} \cong [Cr(CH_2O)_6]^{3+} > [COCl_6]^{3-}$
∵ Order of field strength is $Cl^- < H_2O < NH_3 < CN^-$
CFSE = (−0.4x + 0.6y) so
x= number of electrons in eg
y = number of electrons in eg
so = 4 × (0.4) + 2 × 0.6
= −0.4 Δ_0
Foer Cr^{3+} cl^3 low spin $[Cr(CN)_6]^{3-}$, $[Cr(H_2O)_6]^{3+}$
$\Delta_0 = 3 \times (-0.4) = 1.2\Delta_0$

$\Delta_0 = 6 \times (-0.4) + 0 \times 0.6 = -2.4\ \Delta_0$

$\therefore$ for $[CoCl_6]$ compare magnitude of Δ_0 CFSE is minimum.

40. (a)

B.P increases with increase in molar mass

$CH_3Cl < CH_3Br < CH_2Br_2 < CHBr_3$ iii < i < iv < ii

41. (c)

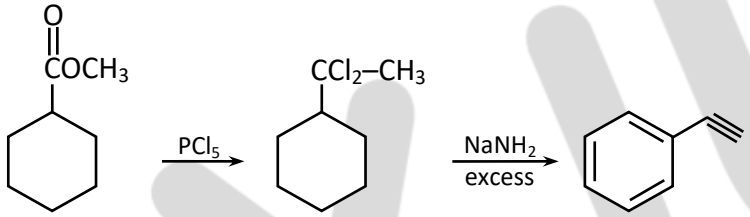
$$R{-}\overset{\overset{O}{\|}}{C}{-}CH_3 + 3NaOx \rightarrow R{-}\overset{\overset{O}{\|}}{C}{-}ONa + CHX_3 + 2NaOH$$

The above reaction is Iodoform test. This test is used to detect the compounds having.

$RCOCH_3$ or RCH (OH) CH_3 structure.

$\because$ Propan-1-ol does not contain the required group So, it does not give iodoform test

42. (c)



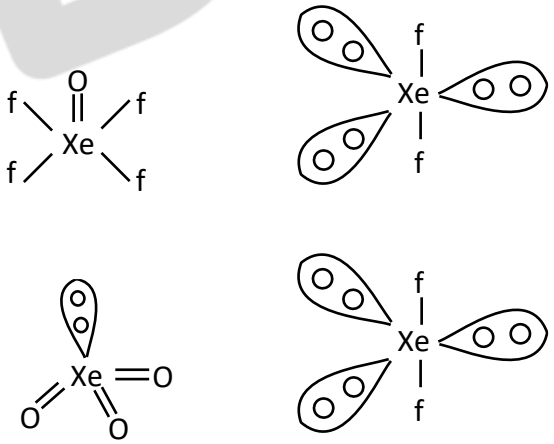
43. (c)

Na_3Alf_6 is the formula of crinoline. It is used in electrolysis of alumina

$\because$ it lower down the fusion temperature from 2050° C to 950°C

$\therefore$ Na_3Alf_6 is used in electrolysis of amnion for lowering.

44. (c)



By seeing the geometries of all compounds.

XeO_3 has pyramidal geometry.

45. (b)

$\Delta T_f = kgm$; $m = \Delta T_f / K_f$

Δ_0 $m = \frac{0.126}{1.86} = 0.1$

$\Delta T_b = Kbm = 0.521 \times 0.1 = 0.0521$

46. (c)

By seeing the plot we can conclude that on increasing the temperature, the molecular velocity increases.

$V_1 > V_2$ then $T_1 > T_2$

47. (a)

$\because$ $NaHCO_3$ is slightly acidic and NaOH is a strong base so when they both are dissolved together then they will react and the reaction is as follows

$\therefore$ $NaHCO_3$ & NaOH cannot exist together.

48. (b)

32 g of O_2 have Na molecules

So 1.8×10^{22} molecules of O_2 will have

$\frac{32\times 1.8\times 10^{22}}{6.022\times 10^{23}} = 0.955 = 0.960$

49. (c)

For finding B.O of O_2^+ the configuration of O_2^+ is

$\sigma 1s^2\ \sigma^*1s^2\ \ \sigma 2s^2\ \sigma^*2s^2\ \ \sigma 2P_z^2\ (\pi\alpha p\alpha^2 = \pi\alpha py^2)$

$(\pi^*2\, p_x^1 = \pi^*2P_y)$

Total electrons in O_2^+ ions is 15

Bond order = $\frac{Nb - Na}{2}$

Nb = No. Of electrons in BMO

Na = No. Of electrons in ABMO

BO = $\frac{10-5}{2}$ BO = 0.25

Electronic configuration for O_2^- is

$\sigma s^2\ \sigma^*1s^2\ \ \sigma 2s^2\ \sigma^*2s^2\ \ \sigma 2P_z^2\ (\pi\alpha\ p_x^2 = \pi\alpha\, p_y^2)$

$(\pi^*\alpha\, p_x^2 = \pi^*\alpha\, p_y^1)$

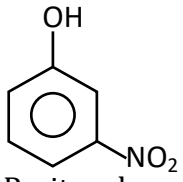
BO = $\frac{10-7}{2} = 0.15$

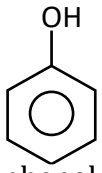
Ion with higher bond order will be stable. Nature of O_2^- is paramagnetic and O_2^+ is diamagnetic.

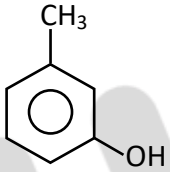
50. (c)
Prontosil is antibacterial drug
When it is taken then it will convert to sulfanilamide in body.

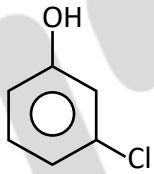
51. (G)
Bonus

52. (c)
The compound will be more acidic when it is stable after donating a proton i.e. when conjugate base is more stable then the compound will be more acidic.
The groups such as CH_3 shows-I effect and decreases the acidic strength when attached to group.
So by analysing structures


P-nitrophenol

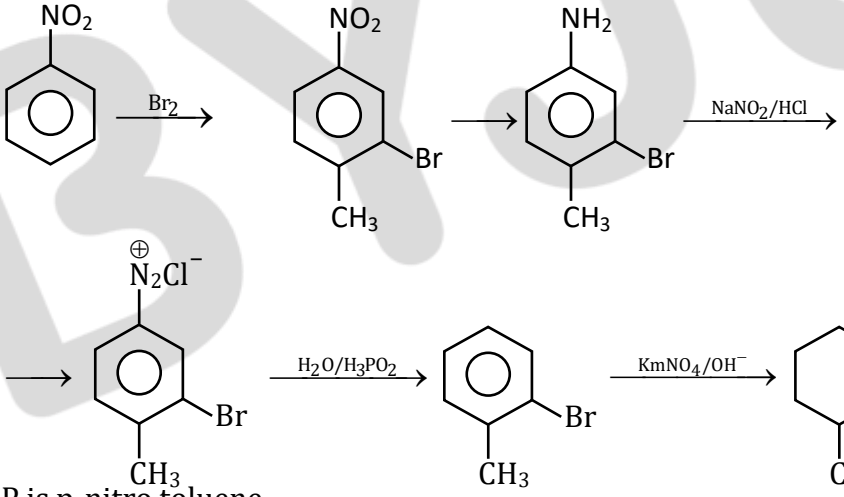

phenol


m-cresol


m-chlorophenol

So increasing order of acidic strength will be ii < iii < iv < i

53. (d)



P is p-nitro toluene.

54. (c)

$$2CH_3COOH + Ca(OH)_2 \rightarrow \begin{matrix} CH_3COO \\ CH_3COO \end{matrix}\!\!>\!Ca + H_2O$$

$$\begin{matrix} CH_3COO \\ CH_3COO \end{matrix}\!\!>\!Ca \xrightarrow{Dry/\Delta} CH_3COCH_3 + CaCO_3$$

Propanone

So correct answer is (c).

55. (c)

The maximum pπ – pπ back bonding exists in
Bf_3 because as the size of halogen atom increases down the group, the overlapping of the vacant 2p-orbital of boron cannot take place easily and efficiently
∵ p-orbital will be of high energy levels.

56. (a)

Toluene exhibit lowest bond dissociation energy because of involvement of C–H in hyper conjugation.
∴ answer is toluene (1)

57. (c)

H_2S is weak electrolyte
∴ it ionizes slightly but HCl is strong electrolyte.
So it can be easily ionized.
$H_2S \rightleftharpoons 2H^+ + S^{-2}$
$HCl \rightarrow H^+ + Cl^-$
If DOD of H_2S is low then concentration of S^{-2} will also be low
∴ sulphides with low solubility will be easily precipitated.

58. (c)

In conversion of Bf_3 to Bf_4^- the hybridisation changes since. Bf_3 has sp^2 hybridisation and Bf_4^- has sp^2 hybridization
∴ answer is 3 i.e Bf_3 to Bf_4^-

59. (d)

Clark's process is type of water treatment used for water softening. Here calcium hydroxide is used to remove hardness i.e. calcium and magnesium ions.
The bicarbonate. Which are present in water undergoes reaction with lime to produce. Carbonates of calcium and magnesium.
∴ Clark's process uses $Ca(OH)_2$ 4.

60. (d)

$NaH + B_2H_6 \xrightarrow{DO\in_0} 2Na^+ [BH_4]^-$
But since the hint is given that the reagent is extensively used so it will be $NaBH_4$ and solvent is diethyl ether.